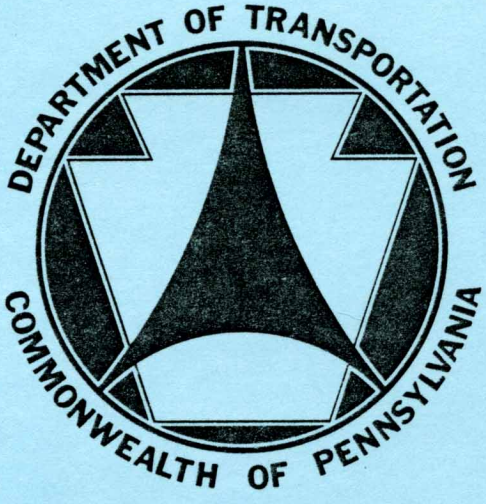
MARKET STUDY
OF
PROPOSED AMTRAK

HARRISBURG - ERIE ROUTE



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DEPARTMENT OF TRANSPORTATION

JANUARY. 1977

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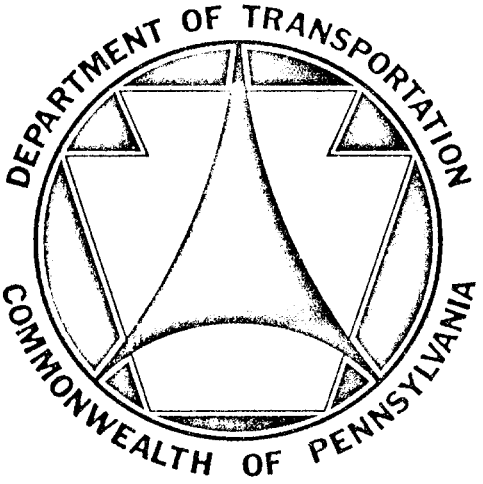

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Summary

The proposed route will provide service within the Harrisburg-Erie corridor through Sunbury, Williamsport, and Warren among other stops. Potential connections to Philadelphia, Pennsylvania and Cleveland, Ohio are presented along with the proposed schedule.

The service would attract approximately 94 patrons daily with directional service provided to Erie on Sunday, Monday, Wednesday and Friday and service to Harrisburg on Monday, Tuesday, Thursday and Saturday. There will be a special schedule to Harrisburg early Monday morning to allow passengers to reach the State Capitol (and Philadelphia) in time for the beginning of the business and collegiate week.

The maximum link volume will be 67 passengers, meaning only one self propelled car will be needed.

The proposed route does have potential revenues of $357,470 annually and potential operating costs of $453,816 yielding an annual deficit of $96,246.

The Need For
HARRISBURG - ERIE
Amtrak Train Service

Purpose

The National Railroad Passenger Act of 1970 in Section 403 (b) provides that rail passenger service can be initiated at a state's request. The report submitted herewith requests the immediate establishment of such service between Harrisburg and Erie with selected intermediate stops.

There is a strong need for this service because of the inadequate and inconvenient service by other modes that currently exists. Many pairs of points are not served at all by bus within the corridor. There has been no rail service on the Harrisburg - Emporium segment for about 7 years and no rail service on the Emporium - Erie segment for about 15 years. Air service between Harrisburg and Erie has been reduced to a connection via Pittsburgh. Direct air service via Bradford has been eliminated.

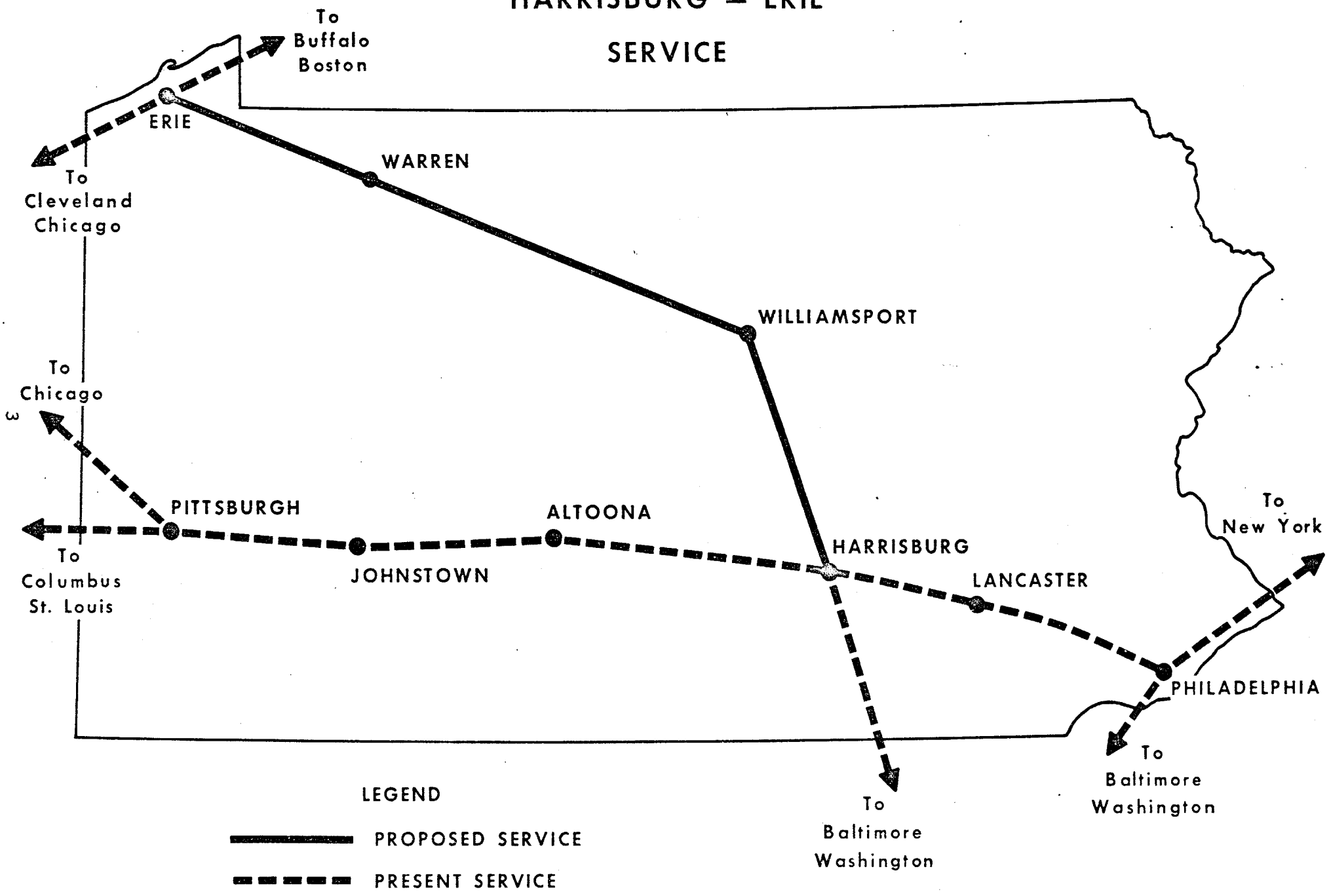
Service in this corridor should be started immediately, primarily for those who don't own or have access to an automobile and for those businessmen and others who prefer to use public transportation. Also, the proposed service area is in a snow belt requiring reliable transportation, and in a recreational area generating seasonal demand at other times of the year. This service will comply with the official designation in the Final System Plan of the United States Railway Association to utilize the Warren to Kane line for passenger service. The State Rail Plan on file with the Federal Railroad Administration also specifies passenger service over this line.

Figure I depicts the proposed route as well as all other present service throughout the State.

FIGURE I

PROPOSED AMTRAK

HARRISBURG – ERIE SERVICE



General Corridor Characteristics
I. Socio-Economic Characteristics

Socio-economic data characteristic of the Harrisburg - Erie corridor are included in this section. The population of the corridor from Harrisburg to Erie is just over 1.1 million. The population figures for the corridor are listed on Table I. The Harrisburg SMSA includes Cumberland, Dauphin, and Perry Counties, the Williamsport SMSA covers Lycoming County, and the Erie SMSA is defined as Erie County.

TABLE I
1970 POPULATION OF CORRIDOR

Area	Population
Harrisburg SMSA	410,626
York Co. - Fairview Township (part)	5,960
Northumberland Co.	99,190
Montour Co.	16,508
Snyder Co.	29,269
Union Co.	28,603
Williamsport SMSA	113,296
Clinton Co.	37,721
Cameron Co.	7,096
Elk Co.	37,770
McKean Co.	51,915
Warren Co.	47,682
Erie SMSA	263,654
	1,149,290

The next few charts focus on the population characteristics of groups that would be likely users of this proposed service. There are 563,052 workers in the corridor or approximately 40% of the corridor's total population; 110,485 of those workers are professional, representing 20% of the total workers. The number of corridor residents attending college and the average family income for each county are also included in Table II.

TABLE II
1970 POPULATION CHARACTERISTICS

County	Total Workers	Professional Workers	% Professional	College Enrolled	Average Family Income
Cameron	2897	593	20	23	10250
Clinton	13681	2652	19	2255	8576
Cumberland	65807	17040	26	7670	12107
Dauphin	95086	20508	21	5008	10797
Elk	13862	2449	17	270	9087
Erie	98722	20136	20	10257	10403
Lycoming	43364	7869	18	3283	9389
McKean	19529	3707	19	553	8986
Montour	5749	1072	19	415	8975
Northumberland	38489	5205	13	976	7861
Perry	10853	1544	14	345	9174
Snyder	11076	1649	15	1140	8868
Union	10403	2051	19	1994	9609
Warren	17442	3470	19	651	10065

Two predominately immobile groups, which are likely candidates to use the proposed service are the over 65 and under 15 age brackets. Approximately 12% of the corridor's population is over 65 while the under 15 group constitutes 32%. All figures by county are listed in Table III.

TABLE III
1970 AGE GROUPINGS

County	Over 65	Under 15
Cameron	680	2206
Clinton	3878	10746
Cumberland	13475	46386
Dauphin	25422	62644
Elk	2580	12892
Erie	24966	83498
Lycoming	13063	33987
McKean	6476	15718
Montour	2408	4341
Northumberland	12930	26994
Perry	2999	8720
Snyder	2737	8539
Union	2775	7402
Warren	5647	14090

College students are a very likely group to use this proposed service. Many lack adequate transportation to and from school. Table IV counts 23,932 students enrolled at 10 colleges and universities within the corridor.

TABLE IV

COLLEGES AND UNIVERSITIES
IN CORRIDOR

Institution	Location	Station	Enrollment
University Center	Harrisburg	Harrisburg	965
Susquehanna University	Selinsgrove	Sunbury	1550
Bucknell University	Lewisburg	Montandon	3111
Lycoming College	Williamsport	Williamsport	1623
Lock Haven State College	Lock Haven	Lock Haven	2377
Edinboro State College	Edinboro	Waterford	7340
Penn State University - Behrend Campus	Erie	Erie	1540
Gannon College	Erie	Erie	3491
Villa Maria College	Erie	Erie	693
Mercyhurst College	Erie	Erie	1242

II. Transportation Characteristics

This corridor has a serious lack of service between points designated as stations along the proposed route. Some of the bus service is totally inadequate or non-existent. There is no through bus service between Harrisburg - Erie and Williamsport - Erie. Lock Haven has no westbound service toward Erie. There is no bus service at Montandon or Renovo. Limited service exists at Montoursville, Jersey Shore, Emporium, Kane, Sheffield, Warren, Youngsville, Corry, Union City, and Waterford. Certain points have service only once per month such as the segment between St. Mary's and Erie. A bus runs one day a year between St. Mary's and Emporium. All Harrisburg - Erie air traffic must connect in Pittsburgh. The train will provide needed transportation in this corridor to fill in the gaps of current bus and air service.

The following charts display the service provided by alternative modes in this corridor. Representative fares are also included.

TABLE V

AIR TRANSPORTATION

	Carrier	Typical No. of One Way Trips Both Ways	One Way Running Time (hrs)	One Way Fare
FROM: HARRISBURG TO: ERIE	Allegheny	5 (all connections via Pittsburgh)	2 - 3	$41
FROM: HARRISBURG TO: WILLIAMSPORT	Altair	6	½	$20

TABLE VI

BUS TRANSPORTATION

		CARRIER	TYPICAL NO. OF ONE WAY TRIPS BOTH WAYS (DAILY)
Harrisburg			
TO:	Dauphin	Greyhound	6
	Millersburg	Greyhound	6
	Herndon	Greyhound	6
	Sunbury	Greyhound	13
	Northumberland	Greyhound	9
	Milton	Greyhound	4
	Williamsport	Greyhound	4
	Erie	Greyhound	5*
	* all connections via Pittsburgh		
Dauphin			
TO:	Millersburg	Greyhound	6
	Herndon	Greyhound	6
	Sunbury	Greyhound	6
	Northumberland	Greyhound	6
	Milton	Greyhound	1
Millersburg			
TO:	Herndon	Greyhound	6
	Sunbury	Greyhound	6
	Northumberland	Greyhound	6
	Milton	Greyhound	1
Herndon			
TO:	Sunbury	Greyhound	6
	Northumberland	Greyhound	5
Sunbury			
TO:	Northumberland	Greyhound	9
		Cont. Trailways	
	Milton	Greyhound	4
		Cont. Trailways	6
	Muncy	Cont. Trailways	5
	Williamsport	Greyhound	4
		Cont. Trailways	6
	Jersey Shore	Cont. Trailways	2*
	Lock Haven	Cont. Trailways	2*
	* connection via Williamsport		
Northumberland			
TO:	Milton	Cont. Trailways	4
	Muncy	Cont. Trailways	4
	Montoursville	Cont. Trailways	2
	Williamsport	Cont. Trailways	4

Montandon

NO BUS SERVICE

Milton

TO:	*Muncy*	*Cont. Trailways*	*5*
	Montoursville	*Cont. Trailways*	*4*
	Williamsport	*Greyhound*	*14*
		Cont. Trailways	*5*
	Jersey Shore	*Cont. Trailways*	*2**
	Lock Haven	*Cont. Trailways*	*2**

* *connection via Williamsport*

Muncy

TO:	*Montoursville*	*Cont. Trailways*	*4*
	Williamsport	*Cont. Trailways*	*10*
	Jersey Shore	*Cont. Trailways*	*2**
	Lock Haven	*Cont. Trailways*	*2**

* *connection via Williamsport*

Montoursville

TO:	*Williamsport*	*Cont. Trailways*	*4*

Williamsport

TO:	*Jersey Shore*	*Cont. Trailways*	*4*
	Lock Haven	*Cont. Trailways*	*8*

Jersey Shore

TO:	*Lock Haven*	*Cont. Trailways*	*4*

Lock Haven

NO WESTBOUND SERVICE

Renovo

NO BUS SERVICE

Emporium (Service on January 1 only)

TO:	*St. Mary's*	*Bluebird*	

St. Mary's

TO:	*Johnsonburg*	*Cont. Trailways*	*2*
	Johnsonburg		
	Kane, Warren	*Bluebird*	
	Youngsville, Corry	*(1st Sunday of month)*	
	Union City, Waterford		
	Erie		

Ridgway

TO:	*Johnsonburg*	*Cont. Trailways*	*2*
	Kane	*Cont. Trailways*	*2*

Johnsonburg

TO:	*Kane*	*Cont. Trailways*	*2*
	Kane, Warren		
	Youngsville, Corry	*Bluebird*	
	Union City, Waterford	*(1st Sunday of month)*	
	Erie		

Kane, Sheffield, Warren Youngsville, Corry, Union City, Waterford, Erie (Bluebird offers service 3 days a week and 1 bus on the first Sunday of the month between all these points)

Representative One Way Bus Fares and Running Time

			Fare	Time (hrs.)
Harrisburg	-	Williamsport	6.10	2½
Harrisburg	-	Erie	20.25	8-10

While travel from Harrisburg to Williamsport or Harrisburg to Erie is far superior time-wise by air, the cost is twice as much. Of course, air service is only provided for these trip interchanges, and all others in this corridor are left without air service.

As the bus schedule shows, very few of the designated stations have service to either Harrisburg or Erie. Some have no service to either of these points. The proposed train will provide the needed transportation to connect all these points along the route. At Williamsport, bus connections will be available for fast interstate highway service direct from New York City.

Proposed Rail Service

The proposed route will serve Harrisburg and Erie as termini and 24 intermediate stops. Flagstops were determined by the number of passengers using that particular station. A map of the proposed route and stations is included as Figure II. A detailed listing of all service areas served by the designated train stations, including the information on population of the minor civil divisions within a service area is shown in Appendix A. The recommended service schedule as displayed in Table VII, includes 4 trains in each direction weekly. The northbound train leaves Harrisburg at 2:00 p.m. and arrives in Erie at 10:50 p.m. This train operates on Sunday, Monday, Wednesday, and Friday. The southbound train departs Erie at 12:01 p.m. and arrives in Harrisburg at 8:55 p.m. This train operates on Tuesday, Thursday, and Saturday. Another return trip to Harrisburg leaves Erie at 12:01 a.m. Monday morning. The train arrives in Harrisburg at 8:55 a.m. for the beginning of the business day. This one train offers convenient one day round trip service to Harrisburg.

The schedule has been prepared for convenient connections to Lancaster and Philadelphia via Amtrak Silverliner Service. Connections to Cleveland are dependent upon the implementation of service as recommended by the United States Railway Association Final System Plan, except on Monday when eastbound connections from the Lake Shore Limited will be offered when that train's schedule is accelerated by removal of current slow orders.

The total distance between Harrisburg and Erie is 340.3 miles. Distances between all stations are contained in Table VIII.

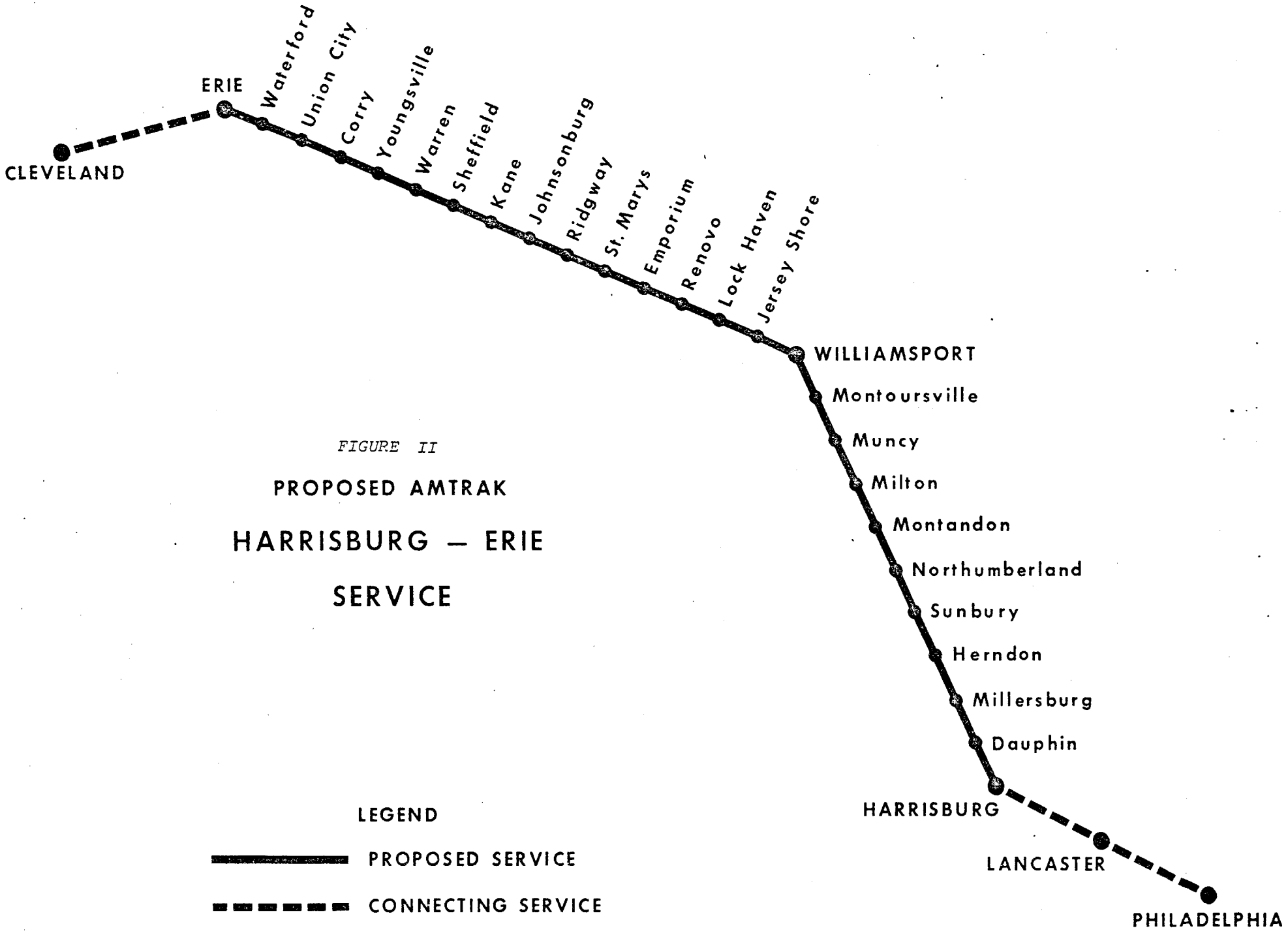


FIGURE II

PROPOSED AMTRAK

HARRISBURG — ERIE

SERVICE

TABLE VII

RECOMMENDED HARRISBURG-ERIE

SERVICE SCHEDULE

READ DOWN	SU MO WE FR				TU TH SA	MO	READ UP
	12:05 pm	Dp	Philadelphia	Ar	10:55 pm	10:56 am	
	1:15		Lancaster		9:41	9:43	
	1:50 pm	Ar	Harrisburg	Dp	9:10 pm	9:10 am	
	2:00 pm	Dp	HARRISBURG	Ar	8:55 pm	8:55 am	
f	2:13		Dauphin		f 8:40	8:40	
	2:35		Millersburg		f 8:17	8:17	
f	2:50		Herndon		f 7:56	7:56	
	3:10		Sunbury		7:40	7:40	
f	3:14		Northumberland		7:35	7:35	
	3:25		Montandon		7:24	7:24	
	3:32		Milton		7:17	7:17	
f	3:47		Muncy		7:02	7:02	
f	3:54		Montoursville		6:56	6:56	
	4:04		WILLIAMSPORT		6:50	6:50	
	4:20		Jersey Shore		6:30	6:30	
	4:40		Lock Haven		6:10	6:10	
	5:15		Renovo		5:35	f 5:35	
	6:15		Emporium		4:35	4:35	
	6:40		St. Marys		4:10	f 4:10	
	6:55		Ridgway		3:55	3:55	
	7:05		Johnsonburg		3:45	f 3:45	
	7:30		Kane		3:20	f 3:20	
	8:35		Sheffield		f 2:15	f 2:15	
	9:00		Warren		1:50	1:50	
f	9:15		Youngsville		f 1:35	f 1:35	
	9:45		Corry		1:05	1:05	
f	10:00		Union City		f12:50	f12:50	
f	10:15		Waterford		f12:30	f12:30	
	10:50 pm	Ar	ERIE	Dp	12:01 pm	12:01 am	
	11:05 pm	Dp	Erie	Ar		11:45 pm	
	12:50 am	Ar	Cleveland	Dp		10:00 pm	

f = stops only on advance request; toll free number

Connections to Lancaster and Philadelphia via Amtrak Silverliner Service

Connections to Cleveland dependent upon Amtrak schedule adjustments

TABLE VIII
DISTANCES BETWEEN STATIONS

	Harrisburg	Dauphin	Millersburg	Herndon	Sunbury	Northumberland	Montandon	Milton	Muncy	Montoursville	Williamsport	Jersey Shore	Lock Haven
Harrisburg	--	8.0	27.0	41.6	53.4	55.9	62.1	65.9	80.9	89.1	93.3	104.9	117.8
Dauphin		--	19.0	33.6	45.4	47.9	54.1	57.9	72.9	81.1	85.3	96.9	109.8
Millersburg			--	14.6	26.4	28.9	35.1	38.9	53.9	62.1	66.3	77.9	90.8
Herndon				--	11.8	14.3	20.5	24.3	39.3	47.5	51.7	63.3	76.2
Sunbury					--	2.5	8.7	12.5	27.5	35.7	39.9	51.5	64.4
Northumberland						--	6.2	10.0	25.0	33.2	37.4	49.0	61.9
Montandon							--	3.8	18.8	27.0	31.2	42.8	55.7
Milton								--	15.0	23.2	27.4	39.0	51.9
Montoursville									--	8.2	12.4	24.0	36.9
Williamsport										--	4.2	15.8	28.7
Jersey Shore											--	11.6	24.5
Lock Haven												--	12.9
													--

	Renovo	Emporium	St. Marys	Ridgway	Johnsonburg	Kane	Sheffield	Warren	Youngsville	Corry	Union City	Waterford	Erie
Harrisburg	145.8	191.0	212.7	223.1	230.8	246.3	261.9	275.3	283.7	303.9	314.9	322.6	340.3
Dauphin	137.8	183.0	204.7	215.1	222.8	238.3	253.9	267.3	275.7	295.9	306.9	314.6	332.3
Millersburg	118.8	164.0	185.7	196.1	203.8	219.3	234.9	248.3	256.7	276.9	287.9	295.6	313.3
Herndon	104.2	149.4	171.1	181.5	189.2	204.7	220.3	233.7	242.1	262.3	273.3	281.0	298.7
Sunbury	92.4	137.6	159.3	169.7	177.4	192.9	208.5	221.9	230.3	250.5	261.5	269.2	286.9
Northumberland	89.9	135.1	156.8	167.2	174.9	190.4	206.0	219.4	227.8	248.0	259.0	266.7	284.4
Montandon	83.7	128.9	150.6	161.0	168.7	184.2	199.8	213.2	221.6	241.8	252.8	260.5	278.2
Milton	79.9	125.1	146.8	157.2	164.9	180.4	196.0	209.4	217.8	238.0	249.0	256.7	274.4
Muncy	64.9	110.1	131.8	142.2	149.9	165.4	181.0	194.4	202.8	223.0	234.0	241.7	259.4
Montoursville	56.7	101.9	123.6	134.0	141.7	157.2	172.8	186.2	194.6	214.8	225.8	233.5	251.2
Williamsport	52.5	97.7	119.4	129.8	137.5	153.0	168.6	182.0	190.4	210.6	221.6	229.3	247.0
Jersey Shore	40.9	86.1	107.8	118.2	125.9	141.4	157.0	170.4	178.8	199,8	210.0	217.7	235.4
Lock Haven	28.0	73.2	94.9	105.3	113.0	128.5	144.1	157.5	165.9	186.1	197.1	204.8	222.5
Renovo	--	45.2	66.9	77.3	85.0	100.5	116.1	129.5	137.9	158.1	169.1	176.8	194.5
Emporium		--	21.7	32.1	39.8	55.3	70.9	84.3	92.7	112.9	123.9	131.6	149.3
St. Marys			--	10.4	18.1	33.6	49.2	62.6	71.0	91.2	102.2	109.9	127.6
Ridgway				--	7.7	23.2	38.8	52.2	60.6	80.8	91.8	99.5	117.2
Johnsonburg					--	15.5	31.1	44.5	52.9	73.1	84.1	91.8	109.5
Kane						--	15.6	29.0	37.4	57.6	68.6	76.3	94.0
Sheffield							--	13.4	21.8	42.0	53.0	60.7	78.4
Warren								--	8.4	28.6	39.6	47.3	65.0
Youngsville									--	20.2	31.2	38.9	56.6
Corry										--	11.0	18.7	36.4
Union City											--	7.7	25.4
Waterford												--	17.7
Erie													--

Rail Patronage Estimation

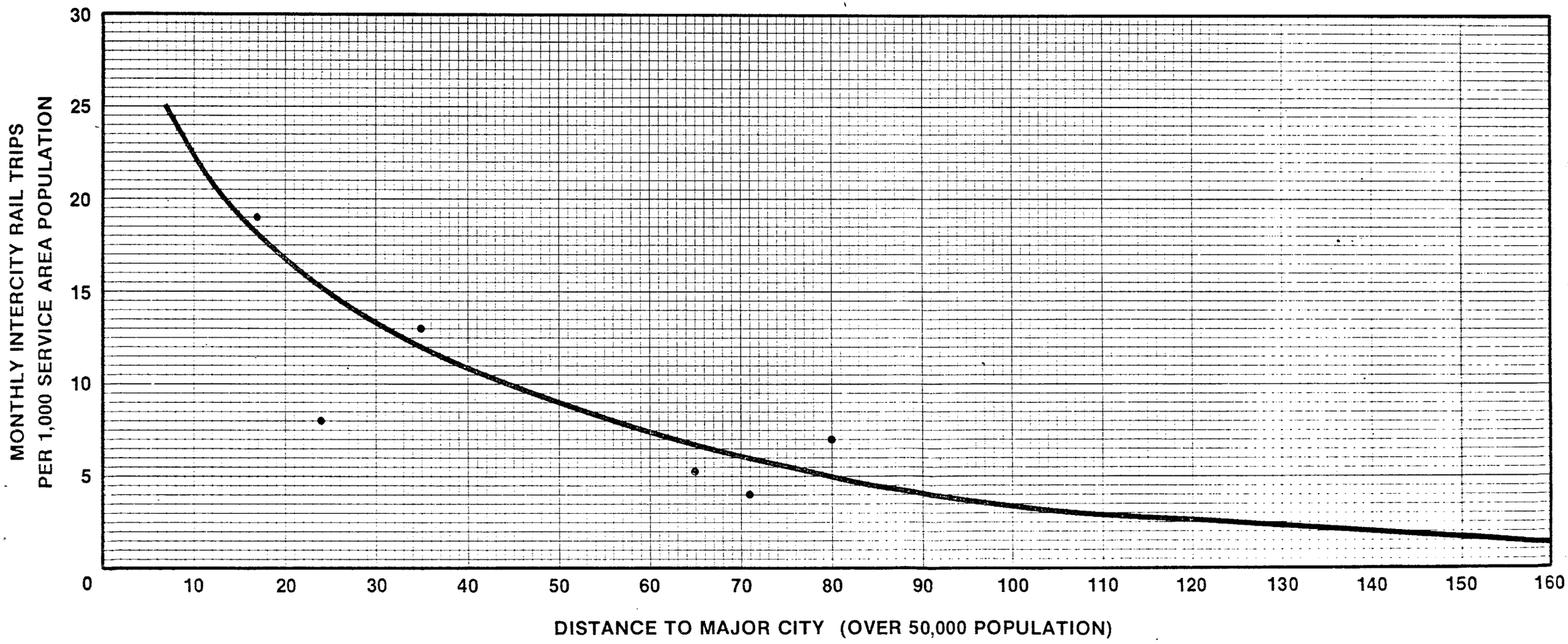
It is customarily difficult to project patronage on existing rail systems but it is even more difficult to assess patronage for systems where new service is proposed.

The major problem associated with a study of new rail service is a lack of data. This fact imposes the requirement that the patronage estimates be based on data from other rail systems. In the case of the Harrisburg-Erie line, an additional problem was presented by the proposed train schedule. The schedule designates train service on alternate weekdays in each direction (except on Monday when service is provided in both directions), thus reducing the choice of trains to potential users. This constraint had to be taken into account when patronage estimates were prepared.

For the purpose of this analysis the estimates of rail patronage were based on data and experience from the intercity rail operation within the Philadelphia-Harrisburg corridor. Only the stations from Paoli to Harrisburg were considered in the development of the demand curve, while trips between the Philadelphia and Harrisburg area were excluded in order to avoid metropolitan area bias in the demand curve. Monthly Ridership data from the seven Amtrak operated trains (#601, #623, #603, #605, #607, #609, #611), were used in order to develop per capita trip rates between the Harrisburg area and the following stations: Mount Joy, Lancaster, Parkesburg, Coatesville, Downingtown and Paoli. The trip rates per 1000 of service area population were calculated and plotted against the distance between respective stations and Harrisburg. A demand curve was hand-fitted, establishing the relationship between the monthly per capita ridership rates and distance to a major urban area (population over 50,000). The Rail Passenger Demand Estimation Curve is

FIGURE III

RAIL PASSENGER DEMAND ESTIMATION



shown in Figure III.

This demand curve was then used for the determination of the monthly ridership estimates between the service areas (stations) on the proposed line, and the two termini, Harrisburg and Erie. The results are summarized in Table IX and Table X, showing the estimates of passengers per train for each direction of travel.

The following is a description of assumptions and procedures used in estimation of monthly rail passengers on the Harrisburg-Erie line as shown in Tables IX and X.

The initial estimates of monthly patronage were determined using the demand curve and the station (service area) population. These estimates are shown in the first column of the Rail Patronage Estimates Tables. Next, the initial estimates were adjusted for the difference in the number of trains. Experience from the Philadelphia-Harrisburg line shows that the first train carries 55 per cent of the total daily ridership, the next two trains carry another 25 per cent, and each of the additional four trains carries approximately 5 per cent of the total daily passenger load. Based on this experience, and the fact that there will be only one train, it was assumed that the proposed train would carry a load equal to the first train plus 50 per cent of an additional two trains, and zero per cent from the additional three, for a total of 68 per cent of the demand if there were three or more trains. This is a reasonable assumption implying that given a choice of one instead of three or more trains a day, some people would switch to the only one available. This adjusted monthly passenger demand by station is shown in the second column of the Rail Patronage Tables.

As it was mentioned earlier, it was necessary to further adjust the patronage estimates to take into account the proposed train schedule. It was decided to prepare estimates of the minimum and maximum expected patronage per

TABLE IX

Rail Patronage Estimates

Origin - Destination	Monthly estimates from the demand curve	Monthly estimates adjusted for the number of trains	Estimates of the minimum number of passengers per train	Estimate of the Maximum number of passengers per train	Esimates of the average number of passengers per train
Harrisburg - Erie	361	246	8	18	13
Dauphin - Erie	7	5	0	0	0
Millersburg - Erie	13	9	0	1	1
Herndon - Erie	5	3	0	0	0
Sunbury - Erie	45	31	1	2	2
Northumberland - Erie	10	7	0	1	0
Montandon - Erie	22	15	1	1	1
Milton - Erie	32	22	1	2	1
Muncy - Erie	21	14	1	1	1
Montoursville - Erie	11	8	0	1	0
Williamsport - Erie	97	66	2	5	3
Jersey Shore - Erie	18	12	0	1	0
Lock Haven - Erie	29	20	1	2	2
Renovo - Erie	8	5	0	0	0
Emporium - Erie	9	6	1	0	1
St. Marys - Erie	38	26	1	2	2
Ridgway - Erie	23	16	1	1	1
Johnsonburg - Erie	20	14	1	1	1
Kane - Erie	26	18	1	1	2
Sheffield - Erie	15	10	0	1	1
Warren - Erie	189	129	4	9	7
Youngsville - Erie					
Corry - Erie					
Union City - Erie					1
Waterford - Erie					
					40

TABLE X

Rail Patronage Estimates

Origin - Destination	Monthly estimates from the demand curve	Monthly estimates adjusted for the number of trains	Estimates of the minimum number of passengers per train	Estimates of the maximum number of passengers per train	Estimates of the average number of passengers per train
Erie - Harrisburg	263	179	6	13	10
Waterford - Harrisburg	5	3	0	0	0
Union City - Harrisburg	8	5	0	0	0
Corry - Harrisburg	19	13	1	1	1
Youngsville - Harrisburg	5	3	0	0	0
Warren - Harrisburg	41	28	1	2	2
Sheffield - Harrisburg	4	3	0	0	0
Kane - Harrisburg	10	7	0	1	0
Johnsonburg - Harrisburg	10	7	0	1	0
Ridgway - Harrisburg	12	8	0	1	0
St. Marys - Harrisburg	23	16	1	2	1
Emporium - Harrisburg	9	6	0	0	0
Renovo - Harrisburg	11	8	0	1	1
Lock Haven - Harrisburg	54	37	1	3	2
Jersey Shore - Harrisburg	35	24	1	2	2
Williamsport - Harrisburg	322	219	7	15	11
Montoursville - Harrisburg	37	25	1	2	2
Muncy - Harrisburg	76	52	2	4	3
Milton - Harrisburg	123	84	3	6	5
Montandon - Harrisburg	87	59	2	4	3
Northumberland - Harrisburg	42	29	1	2	2
Sunbury - Harrisburg	209	142	5	10	8
Herndon - Harrisburg Millersburg - Harrisburg Dauphin - Harrisburg					1
					54

train, and then by taking the average of the two estimates, prepare final estimates by train, the origin station, and by destination.

Since the train will run only every other day in a particular direction, it will be inconvenient for some travellers. The minimum number of passengers per train would occur if no one would adjust his or her personal or business schedule to meet the train schedule. Therefore, any potential train patrons wishing to travel from Harrisburg to Erie on Tuesday, would change modes because the train only runs in this direction Mondays and Wednesdays. The minimum patrons per train would therefore be the monthly patrons divided by the days in a month (30.5).

Similarly the maximum per train patronage would be attained if everyone would adjust his or her schedule to be able to use the rail service. There would, on the average, be 14 trains in each direction monthly. Therefore the maximum patronage per train would be the monthly estimated patronage divided by 14.

Admittedly neither case is likely to occur, so an average of the minimum and maximum per train patronage estimates was calculated. This average was used as the estimated of patronage levels per train in cost and revenue calculations, as well as in the determination of rolling stock necessary on this line.

The rail passenger train leaving Erie at 12:01 a.m. on Mondays and returning the same evening represented a unique case. In addition to the normal estimated patronage on this train, additional patrons will be attracted between Lock Haven and Harrisburg due to the availability of one day round trip service.

As can be seen from Table IX and X, certain stations were assumed to contribute insignificant patronage in a particular direction, (in aggregation one passenger per train), and were noted as flag stops in the proposed schedule.

Rolling Stock

Based on the patronage estimates, a link-by-link volume diagram was prepared showing the average expected volume per train for each link. This is presented in Figure IV. As can be seen from the diagram the maximum link volume reaches 67 passengers a train, which means that one 90-seat self-propelled rail car will be adequate to serve this line.

The link estimates were made with the assumption that all the passengers who travel in one direction will return on the next available train. In reality we may expect link volumes to vary, but that variation should not affect rolling stock requirements significantly.

Estimates of Annual Revenues and Operating Costs

In order to prepare revenue estimates, a fare structure had to be developed and then tied to the ridership estimates which were previously determined. The fare structure was developed on the basis of 50¢ plus 6¢ per mile. Zones were established, hence, stations that are relatively close together will be in the same zone and have the same fare. The fares are comparable to that of the limited bus service in the corridor. The maximum fare between Harrisburg and Erie is $21.00 one-way. Table XI contains the sample fare structure to Harrisburg and to Erie.

Based on the estimated patronage level of 90 passengers per train and their distribution by origin and destination, as well as the proposed fare structure, the estimate of total annual revenue was determined to be $357,470.

FIGURE IV

AVERAGE LINK VOLUMES PER TRAIN

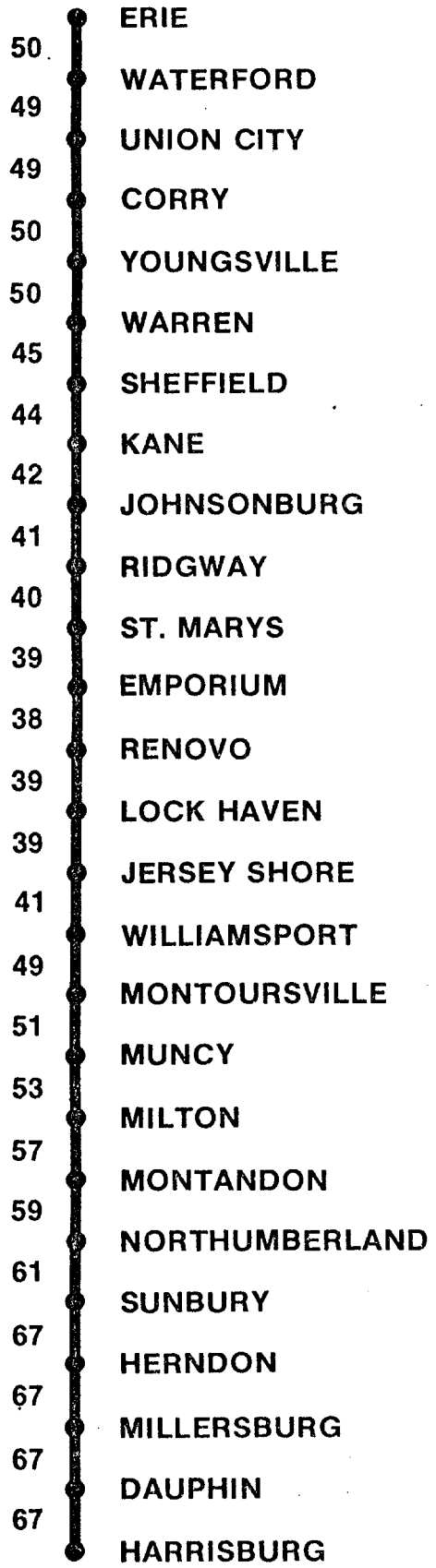


TABLE XI

Sample Fare Structure

TO:	HARRISBURG	FROM:	TO:	ERIE
$	-	HARRISBURG	$	21.00
	1.00	DAUPHIN		21.00
	2.15	MILLERSBURG		19.20
	3.00	HERNDON		18.35
	3.75	SUNBURY		17.60
	3.75	NORTHUMBERLAND		17.60
	4.25	MONTANDON		17.00
	4.25	MILTON		17.00
	5.30	MUNCY		16.10
	6.00	MONTOURSVILLE		15.30
	6.00	WILLIAMSPORT		15.30
	6.75	JERSEY SHORE		14.45
	7.40	LOCK HAVEN		13.80
	9.20	RENOVO		11.85
	12.00	EMPORIUM		9.00
	13.25	ST. MARYS		7.70
	13.25	RIDGWAY		7.70
	13.80	JOHNSONBURG		7.15
	15.25	KANE		6.15
	16.20	SHEFFIELD		5.20
	17.00	WARREN		4.20
	17.50	YOUNGSVILLE		3.60
	18.75	CORRY		2.25
	19.50	UNION CITY		1.50
	19.50	WATERFORD		1.50
	21.00	ERIE		-

Monthly operating costs were determined based on actual experience on the railroad lines radiating out of Philadelphia. The breakdown of cost factors used in this analysis is as follows:

Maintenance of Way & Structures:	
340.3 miles x 1.143 trips/day x 1 car x 30.5 days/month @ 8¢*	*949*
Station Maintenance: $20,000 ÷ 12	*1,667*
Maintenance of Equipment:	
2 cars @ $2,000 per car	*4,000*
11,863 car miles @ 25¢/car mile	*2,966*
Fuel: 11,863 car miles @ 14¢/car mile	*1,661*
Train and Engine Crew:	
$299/day x 1.4 fringe benefits x 30.5 days	*12,776*
Train Supplies and Expenses:	
11,863 car miles x 17¢/car mile	*2,017*
Traffic Management and Expenses:	*4,000*
General and Administration Expenses:	*6,680*
Liability Accrual @ 3%	*1,102*
Estimated Monthly Costs - 1977,	*$37,818*

**Note - Mondays one trip in each direction*

Total Annual Operating Costs:

$37,818 x 12 months	-	*$453,816*
Total Estimated Annual Revenues		*$ 357,470*
Total Estimated Annual Costs		*$453,816*
Net Estimated Annual Operating Revenue (deficit):		*($ 96,346)*

Energy and Operating Cost Savings

The train uses ½ gallon of fuel per mile. Thus, approximately 170 gallons of fuel will be used for a one-way trip between Harrisburg and Erie. To determine the gallons of fuel needed for automobiles, the following method was used.

No. of passengers between stations	/	*1.5 passengers per vehicle*	=	*No. of vehicles needed between stations*
No. of miles between stations	x	*No. of vehicles needed between stations*	=	*No. of vehicle miles between stations*
No. of vehicle miles between stations	/	*12 vehicle miles per gallon*	=	*No. of gallons used between stations*

Example: From Harrisburg to Erie

13 passengers between stations	/	*1.5 passengers per vehicle*	=	*9 vehicles needed*
340.3 miles	x	*9 vehicles*	=	*3062.7 vehicle miles*
3062.7 vehicle miles	/	*12 vehicle miles per gallon*	=	*255.2 gallons used by all cars between stations*

In total, 70,720 gallons of fuel will be used by the train annually; 190,200 gallons of fuel would be used by automobiles annually serving the same amount of travellers. Assuming all traffic diverted to the train would be from autos, 119,480 gallons of fuel can be saved. The fuel saving is worth $55,000 per year.

One fact which might be realized is that rail passenger usage will result in a significant reduction in auto vehicle operating costs. Approximately $275,000/year in operating costs would be saved in this corridor based on the patronage estimated in this market study, assuming a 7½¢/mile out-of-pocket expense as determined by the Federal Highway Administration.

APPENDIX

APPENDIX A
SERVICE AREAS

STATION	MCD'S	1970
Harrisburg (Dauphin Co.)	Harrisburg Urbanized Area (Dauphin, Cumberland, Perry & York Counties; parts)	240,751
Dauphin (Dauphin Co.)	Dauphin Borough	998
	Middle Paxton Township	3,362
Millersburg (Dauphin Co.)	Millersburg Borough	3,074
	Upper Paxton Township	2,718
	Halifax Borough	907
	Halifax Township	2,038
		8,737
Herndon (Northumberland Co.)	Herndon Borough	507
	Jackson Township	790
	Jordan Township	698
	Lower Mahanoy Township	1,488
		3,483
Sunbury (Northumberland Co.)	Sunbury City	13,025
	Upper Augusta Township	2,354
	Lower Augusta Township	664
	Rockefeller Township	1,312
	*Shamokin Dam Borough	1,562
	*Selinsgrove Borough	5,116
	*Monroe Township	2,447
	*Penn Township	3,329
	*(in Snyder Co.)	29,809
Northumberland (Northumberland Co.)	Northumberland Borough	4,102
	Point Township	2,308
		6,410
Montandon (Northumberland Co.)	West Chillisquaque Township	2,376
	East Chillisquaque Township	567
	*Lewisburg Borough	6,376
	*Buffalo Township	1,789
	*East Buffalo Township	3,460
	*(in Union Co.)	14,568
Milton (Northumberland Co.)	Milton Borough	7,723
	Turbot Township	1,480
	Watsontown Borough	2,514
	McEwensville Borough	247
	Turbotville Borough	627
	Lewis Township	1,169
	Delaware Township	2,619
	*Kelly Township	4,166
	*(in Union Co.)	
	**Limestone Township	602
	**(in Montour Co.)	21,147

Muncy	Muncy Borough	2,872
(Lycoming Co.)	Hughesville Borough	2,249
	Muncy Creek Township	2,473
	Wolf Township	1,473
	Montgomery Borough	1,902
	Clinton Township	1,934
	Muncy Township	880
		13,783
Montoursville	Montoursville Borough	5,985
(Lycoming Co.)	Fairfield Township	1,420
		7,405
Williamsport	Williamsport City	37,918
(Lycoming Co.)	South Williamsport Borough	7,153
	Duboistown Borough	1,468
	Armstrong Township	727
	Woodward Township	2,014
	Old Lycoming Township	4,616
	Loyalsock Township	10,581
		64,477
Jersey Shore	Jersey Shore Borough	5,322
(Lycoming Co.)	Porter Township	1,283
	Piatt Township	1,013
	*Avis Borough	1,749
	*Pine Creek Township	2,272
	*(in Clinton Co.)	11,639
Lock Haven	Lock Haven City	11,427
(Clinton Co.)	Flemington Borough	1,519
	Mill Hall Borough	1,838
	Allison Township	270
	Bald Eagle Township	1,282
	Woodward Township	2,427
	Dunstable Township	839
		19,602
Renovo	Renovo Borough	2,620
(Clinton Co.)	South Renovo Borough	662
	Chapman Township	981
	Leidy Township	305
	Noyes Township	522
		5,090
Emporium	Emporium Borough	3,074
(Cameron Co.)	Portage Township	284
	Shippen Township	2,892
		6,250
St. Marys	St. Marys Borough	7,470
(Elk Co.)	Benzinger Township	7,755
		15,225
Ridgway	Ridgway Borough	6,022
(Elk Co.)	Ridgway Township (66 2/3%)	1,720
		7,742

Johnsonburg	Johnsonburg Borough	4,304
(Elk Co.)	Ridgway Township (33 1/3%)	858
	Jones Township	1,636
		6,798
Kane	Kane Borough	5,001
(McKean Co.)	Wetmore Township	1,837
		6,838
Sheffield	Sheffield Township	2,793
(Warren Co.)		2,793
Warren	Warren Borough	12,998
(Warren Co.)	Clarendon Borough	735
	Conewango Township	6,405
	Glade Township	2,711
	Mead Township	1,787
	Pleasant Township	2,399
		27,035
Youngsville	Youngsville Borough	2,158
(Warren Co.)	Broken Straw Township	1,463
		3,621
Corry	Corry City	7,435
(Erie Co.)	Concord Township	1,213
	Wayne Township	1,623
	Elgin Borough	173
	*Columbus Township	1,767
	*Spring Creek Township	700
	*(in Warren Co.)	12,911
Union City	Union City Borough	3,631
(Erie Co.)	Union Township	1,482
		5,113
Waterford	Waterford Borough	1,468
(Erie Co.)	Waterford Township	2,119
	Edinboro Borough	4,871
	Washington Township	2,118
		10,576
Erie	Erie Urbanized	175,263
(Erie Co.)	Area	

APPENDIX B
MOTOR VEHICLE REGISTRATION

County	Passenger	Station Wagon	Total
Cameron	3440	640	4080
Clinton	17494	3423	20917
Cumberland	95291	17478	112769
Dauphin	124065	19949	144014
Elk	17106	3154	20260
Erie	137890	20914	158804
Lycoming	56980	10931	67911
McKean	25018	4314	29332
Montour	7476	1216	8692
Northumberland	47843	7546	55389
Perry	18026	3129	21155
Snyder	14481	2523	17004
Union	14041	2751	16792
Warren	22844	3792	26636